

Research in Progress

Effect of Asphalt Binder Source on Asphalt Mixture Performance

Research Need

Recent research has shown that transportation agencies are increasingly experiencing premature failures of some of their asphalt mixtures that did not fail previously. Some reasons that might attribute to these failures include: variability in the source of the base binder used to produce the mixture, switching to a different binder supplier during production as compared to the mixture design phase, and suppliers using different modifiers and/or additives with a base binder to meet the target Performance Grade. Hence, research is needed to evaluate if the quality of the asphalt binders used during the entire production process, regardless of the binder source or type of modification, will provide the targeted mixture performance.

Goals/Objectives

The main objective is to assess the implications of changes in asphalt binder formulation and source during mix design and production. The following research objectives were established:

1. Determine which binder properties display significant variations between different production lots and sources.
2. Determine which changes in binder properties alter a mixture's laboratory performance.
3. Perform life cycle cost analysis.
4. Establish specifications for allowable binder property tolerances.
5. Provide a roadmap for MassDOT to update their asphalt pavement specifications to incorporate new binder testing protocols for both mix design approval and construction.

Project Information

This project is being conducted as part of the Massachusetts Department of Transportation (MassDOT) Research Program with funding from Federal Highway Administration (FHWA) State Planning and Research (SPR) funds.

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Performing Organization:

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Project Champion:

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Project Start Date:

February 2nd, 2023

Expected Project Completion Date:

September 30th, 2025

Methodology

The experimental plan designed for this study includes:

1. Develop and conduct internet surveys of asphalt binder suppliers and producers.
2. Obtain asphalt binders used in Massachusetts and conduct asphalt binder testing.
3. Determine which asphalt binder parameters capture any significant variation between production lots and sources.
4. Perform a mixture design and conduct performance testing.
5. Perform life cycle cost analysis (LCCA).
6. Select a binder property and develop specification tolerance.
7. Develop a roadmap for MassDOT.

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